<u>SET CAREERS</u> *(known as SCIENCE, ENGINEERING & TECHNOLOGY)*
All static exhibits must have received a purple ribbon at the county fair to advance to the State Fair.
Premier 4-H Science Award is available in this area. Please see General Rules for more details.
The name and county of each exhibitor should appear separately on the back of each board, poster or article and on the front cover of the notebooks so owner of exhibit may be identified if the entry tag is separated from the exhibit.

SET – AEROSPACE (ROCKETS/DRONES)

This category gives 4-H'ers a chance to display the rockets and drones they have created. Through participation in this category 4-H'ers will show judges what they learned about and how they adapted their exhibits throughout this project. Involvement in SET Aerospace gives participants a first-hand experience in modern technology. For help getting started with this project contact your county 4-H office.

RULES:
1. Rockets must be supported substantially to protect the rocket from breakage. Rockets are to be mounted on a base that has dimensions equal or less than 12" x 12" and the base should be 3/4" thick. No metal bases. If the rocket fins extend beyond the edges of the required base (12" x 12"), and then construct a base that is large enough to protect the fins. The base size is dictated by the size of the rocket fins.
2. The rockets must be mounted vertically. Please do not attach sideboards or backdrops to the displays. In addition a used engine or length of dowel pin is to be glued and/or screwed into the board and extended up into the rockets engine mount to give added stability.
3. Rockets must be equipped as prepared for launching, with wadding and parachute or other recovery system. Rockets entered with live engines, wrong base size or sideboards will be disqualified.
4. A report, protected in a clear plastic cover, must include: 1) rocket specification (include original or photo of manufacture packaging stating rocket skill level), 2) a flight record for each launching (weather, distance, flight height), 3) number of launchings, 4) flight pictures, 5) Safety (how did you choose your launch site? Document safe launch, preparations, and precautions) 6) objectives learned and 7).conclusions.
5. The flight record should describe engine used, what the rocket did in flight and recovery success. Points will not be deducted for launching, flight or recovery failures described. This includes any damage that may show on the rocket. Complete factory assembled rockets will not be accepted at the State Fair.
6. Judging is based upon display appearance, rocket appearance, workmanship, design or capabilities for flight, number of times launched and report Three launches are required to earn the maximum launch points given on the score sheets. For scoring for the State Fair, only actual launches count, misfires will not count towards one of the required three launches.
7. For self-designed rockets only, please include a digital recorded copy of one flight. In the documentation please include a description of stability testing before the rocket was flown.
8. Skill level of project is not determined by number of years in project. Skill level is determined by the level listed on a manufacturing packaging. 4-H Rocket project levels are not intended to correspond to National Association of Rocketry model rocket difficulty rating or levels. High power (HPR) is similar to model rocketry with differences that include the propulsion power and weight increase of the model. They use motors in ranges over "G" power and/or weigh more that laws and regulations allow for unrestricted model rockets. These rockets are NOT appropriate for 4-H projects and will be disqualified.
9. Posters can be any size up to 28" by 22" when ready for display. Example: tri fold poster boards are not 28" by 22" when fully open for display.

ROCKETS
C) **H850901**   **Kite –** must be homemade, no purchased kits
C) **H850902**   **Model Airplane or Glider**
C) **H850903**   **Rocket-** Any skill level with plastic fins
C) **H850904**   **Rocket**- level 1 with wooden fins

Youth enrolled in Aerospace 2, 3, or 4 may exhibit in any class within this division.

SF) **H850001**   **Rocket** *(SF92)* – Any skill level rocket with wooden fins and cardboard body tubes painted by hand or air brush.
SF) **H850002**   **Aerospace Display** *(SF93)* – Poster or display board that displays or exemplifies one of the principles learned in the Lift-Off Project. Examples include: display of rocket parts and purpose, explains the parts of a NASA rocket or shuttle, interview of someone in the aerospace field or kite terminology. Include notebook containing terminology (definitions), and what was learned. Display can be any size up to 28"x22".
SF) **H850003**   **Rocket** *(SF92)* – Any skill level rocket with wooden fins and cardboard body tubes painted using commercial application, for example: commercial spray paint.
Self-Designed Rocket
SF) **H850007**   **Rocket** *(SF92)* – Any self-designed rocket with wooden fins and cardboard body tubes.

DRONES
SF) **H850009**   **Drone Poster** (SF??) Exhibit must be designed to educate yourself and others on one or more of the following topics: drone technologies, use of drones, the different types of drones, types of training needed to operate drones, and the laws and regulations users must follow. Posters can be any size up to 28" by 22".
SF) **H850006**   **Drone Video** – Exhibit must demonstrate how the drone interacts with the outside world. Examples include: field scouting, surveying damage from natural disasters, drones used in commercial applications and settings, and drones used

for structural engineering. Video should not exceed 5 minutes. Videos going to State Fair should also be uploaded to a video streaming application and exhibitors must provide a hard copy QR code for viewing. These need to be submitted to Amy Timmermann by August 15th 2022

SET – COMPUTERS

This category gives 4-H'ers a chance to display their knowledge of computers. Through participation in this category 4-H'ers will develop presentations that show judges their knowledge in the different aspects of computer science. Involvement in SET Computers gives participants a first-hand experience in modern technology.

RULES:
1. Demonstration boards should include an overall title for the display, plus other necessary labeling.
2. Reports should be written using the scientific method used and observation, Results: what you learned.) All reports should be computer generated and enclosed in a clear plastic cover. The reports should be attached securely to the display.
3. Refer to the General Rules for the policy regarding firearms, items with a blade, and related items.
4. Please refer to the general rules for the policy regarding use of copywritten images.

Team entries – To qualify for entry at the Nebraska State Fair team materials entered in H860007 – Maker Space/Digital Fabrication must clearly be the work of a team instead of an individual, and must have at least 50% of all team members enrolled in 4-H. Additionally, all enrolled 4-H members on the team should complete and attach an entry tag to the materials. A supplemental page documenting the individual contributions to the project should be included. The entry will be judged as a team, with all team members receiving the same ribbon placing.

COMPUTER MYSTERIES – UNIT 1

C) H860903 **Computer Art Poster** – Exhibit should be created on 8 /12" x 11" paper using commercially available graphics software package and color or black and white paper. 4-H theme of your choice suggested. Exhibit should be mounted on 14" x 11" black poster board.

C) H860904 **Greeting Card** – Develop a series of 3-5 greeting cards, each for a different occasion. Exhibit should be created on 8 ½" x 11" paper using commercially available graphics programs and a color or black and white paper. The cards should vary in fold and design. Tell what software package was used on the back. Pre-fabricated cards from commercially available card programs will NOT be accepted. Put cards in a protective plastic cover or notebook.

C) H860905 **Manipulate Photographs** – Using an imaging program, create a series of special effects photos. Exhibits should be created on 8 ½" x 11" paper. The series should use at least three of the following effects: texture, changing brightness and contrast, filters, magic wand techniques, composite images, cropping or resizing. Tell what imaging program was used.

COMPUTER MYSTERIES – UNIT 2

SF) H860001 **Computer Application Notebook** *(SF277)* – 4-H exhibitor should use computer application to create a graphic notebook utilizing computer technology. 4-H'er may create any of the following: greeting card (5 different cards such as a birthday, wedding, anniversary, sympathy, get well or other); a business card (3 cards for 3 different individuals and businesses); menu (minimum of 2 pages including short description of foods and pricing); book layout (I-book); promotional flyer (3 flyers promoting 3 different events); newsletter (minimum 2 pages; or other examples such as precision farming or family business logo etc. This exhibit consists of a notebook (8.5 x11 inches) which should include a (1) a detailed report describing (a) the task to be completed, (b) the computer application software required to complete the task, (c) specific features of the computer application software necessary for completing the task (2) print out of your project. Project may be in color or black and white.

SF) H860002 **Produce a Computer Slideshow Presentation** *(SF276)* – Using presentation software a 4-H exhibitor designs a multimedia computer presentation on one topic related to youth.   Slide shows for state fair must be emailed ahead of State Fair. Files must be saved in a PC compatible format with county name and last name of participant before emailing or the slide show may be shared through a share link or QR code which is included in the notebook. A notebook with a printout of all the slides should be submitted. Slideshow should include a minimum of 10 slides and no more than 25. Incorporate appropriate slide layouts, graphics and animations and audio (music or voice and transition sounds do not count). Each slide should include notes for a presenter. All slideshows must be up loaded.

COMPUTER MYSTERIES – UNIT 3

SF) H860003 **Produce an Audio/Video Computer Presentation** *(SF276)* – Using presentation software a 4-H exhibitor designs a multimedia computer presentation on one topic related to youth. All presentations for state fair need to be emailed. See State Fairbook for details. The presentation should be at least 2 minutes in length and no more than 5 minutes in length, appropriate graphics, sound and either a video clip, animation or voice over and/or original video clip. The presentation must be able to be played and viewed on a PC using Windows Media Player, Real Player, iTunes or QuickTime Player. A notebook with a printout of all the slides should be submitted.

SF) H860004 **How to STEM (Science, Technology, Engineering, and Math) Presentation** *(SF276)* – Youth design a fully automated 2 to 5 minutes 4-H "how-to" video. Submissions should incorporate a picture or video of the 4-Her, as well as their name (first name only), age (as of January 1 of the current year), years in 4-H, and their personal interests or hobbies. Videos should be designed for web viewing or may be uploaded to a video streaming application and exhibitors can provide a hard copy QR code for public viewing. Any of the following formats will be accepted: .mpeg, .rm, .wmv, .mp4, .ov, .ppt, or .avi.

SF) H860005   **Create a Web Site/Blog or App** *(SF275))* – Design a simple Web site/blog or app for providing information about a topic related to youth using either software programs such as an HTML editor like Microsoft's FrontPage or Macromedia's Dreamweaver, and image editor like IrfanView or GIMP or online using a WIKI such as Google Sites. If the web site, Blog, or App isn't live include all files comprising the web site, Blog or App should be submitted on a flash drive in a plastic case along with the explanation of why the site was created or may be shared through a hard copy share link or QR code for viewing. If developed using a WIKI or other online tool include a link to the website in the explanation of why the site was created.

SF) H860006   **3D Printing***: (SF1050)* 3D printing uses plastic or other materials to build a 3 dimensional (3D) object for a digital design (including 3D Pen Creation). Youth may use original designs or someone else's they have re-designed in a unique way. Exhibits will be judged based on the motivation and/or problem identified. For example, 3D objects printed as part of the design process for robot or other engineering project. Must include design notebook that addresses the following questions: 1)What was the motivation for your design or the problem you were solving with your design? Ie. Is your item a functional or decorative piece? 2). Please include a picture of original design, citation of designer/website OR if design is completely original (you created it using CAD software), then state that it's original. If item was not completely original, indicate what you did to the original design to modify it to better meet the design problem stated in #1 above. Its design was modified multiple times, please indicate what change was made with each modification, and what prompted the need for the change. Ie. I printed it and the design was too fragile, so I resliced the print to make thicker external walls, or to have a denser infill. 3).Define your process for designing/printing. What software and/or hardware was used (indicate type of 3D printer or if item was created with 3D pen)? 4) What materials were selected for your project? 5) If your final design has any moving parts, define how you determined appropriate allowance in your design. 6) Identify any changes that you would make to improve your design.

SF) H860007   **Maker Space/Digital Fabrication** *(SF1051)* This project is a computer generated project created using a laser cutter, vinyl cutter, heat press or CNC router. Vector or 3D based software such as a corel draw or Fusion 360 would be an example of an appropriate software used to create your finished project. Project should include a notebook with the following: 1) What motivated you to create this project. 2) Software and equipment used 3) Directions on how to create the project. 4) Prototype of plans 5) Cost of creating project. 6) Iterations or modifications made to original plans 7) Changes you would make if you remade the project.

SET – ELECTRICITY

In this category 4-H'ers have the opportunity to create informational exhibits about the different aspects of electricity. Through involvement in this category 4-H'ers will be better educated about electricity and be able to present their knowledge to others.

RULES:

1. The name and county of each exhibitor should appear separately on the back of each board, poster or article and on the front cover of the notebooks so owner of the exhibit may be identified if the entry tag is separated from the exhibit.

2. Several classes require a display board which should be a height of 24 inches and not to exceed 1/4-inch thickness. A height of 24 7/8 inches is acceptable to allow for the saw kerf (width) if two 24 inch boards are cut from one end of a 4 foot by 8 foot sheet of plywood. Nothing should be mounted within ¾ of the top or bottom of the board. (Example: Woodworking & Electricity.)

- Fabricated board such as plywood, composition board, or particle-type lumber may be used for demonstration displays.
- Demonstration boards should be sanded and finished to improve their appearance. The finish on a demonstration board will be judged as a woodworking exhibit.
- Demonstration boards should include an overall title for the display, plus other necessary labeling.
- Reports should be written using the scientific method whenever possible (Background, the question or hypothesis, what you plan to do and what you did, Method used and observations, Results: what you learned. All reports should be computer generated and enclosed in a clear plastic cover. The reports should be attached securely to the display.

MAGIC OF ELECTRICITY – UNIT 1

C) H870901   **Bright Lights** – Create your own flash light using items found around your house. Flash lights should be made out of items that could be recycled or reused. No kits allowed.

C) H870902   **Control the Flow** – Make a switch. Use the following items: D cell battery, battery holder, insulated wire, 2 or 2.5 volt light bulb, bulb holder, paper clip, cardboard and two brass paper fasteners to create a circuit that you can open and close.

C) H870903   **Conducting Things** – Make a circuit with a switch and a light bulb that can be used to test different household items for their ability to act as an insulator or conductor. You must find five items that are conductors and five items that are insulators. Create a table that illustrates your results.

C) H870904   **Is There a Fork in the Road** – Using the following items to construct one parallel and one series circuit. Items: D cell battery, battery holder, insulated wire, bulb holder and a 2 or 2.5 volt light bulb.

C) H870905   **Electrical Poster** – Poster should exemplify one of the lessons learned in the Magic of Electricity Project. Posters size is 14" x 22", either horizontal or vertical.

C) H870906   **Electric Energy Conservation**. Must show useful methods of efficient use of electrical energy and conservation.

INVESTIGATING ELECTRICITY – UNIT 2

C) H870907   **Case of the Switching Circuit** – Use the following items: two D cell batteries, two battery holders, light bulb, bulb holder, a 3" x 6" piece of cardboard, six brass paper fasteners and approximately 2 feet of 24 gauge insulated wire to build a three way switch. Write a short essay or create a poster that illustrates how three way switches function.

C) H870908   **Rocket Launcher** – Construct a rocket launcher out of the following materials: a plastic pencil box that is at least 4" x 8", single pole switch, normally open push button switch, 40 feet or 18 or 22 gauge stranded wire, 4 alligator clips, 2" x 6" board (6" long), 1/8" diameter metal rod, rosin core solder, soldering iron or gun, wire stripper, small crescent wrench, pliers, small Phillips and straight blade screwdrivers, drill, 1/8 " and ¼" drill bits, rocket engine igniters, additional drill bits matched to holes for two switches. You may successfully build a rocket launcher and light two rockets igniters with your launcher. You DO NOT have to actually fire a rocket off of the launcher. Create a poster using photographs to show the step by step process you used to build your launcher.

C) H870909   **Stop the Crime** – Build an ALARM using the following materials: on-off push button switch, mercury switch, buzzer-vibrating or piezoelectric, 9-volt battery, 9-volt battery holder, 4" x 4" x 1/8" Plexiglas board to mount circuit on, rosin core solder, soldering iron or gun, 2 feet of 22 gauge wire, wire strippers, hot glue sticks, hot glue gun and a plastic box with a lid to mount your alarm circuit on. Create a poster using photographs to show the step by step process you used to build your alarm.

C) H870910   **Electrical Poster** – Poster should exemplify one of the lessons learned in the Investigating Electricity Project. Posters size is 14" x 22", either horizontal or vertical.

WIRED FOR POWER – UNIT 3

SF) H870001   **Electrical Tool/Supply Kit** *(SF224)* – Create an electrical supply kit to be used for basic electrical repair around the house. Include a brief description of each item and its use. Container should be appropriate to hold items.

SF) H870002   **Lighting Comparison** *(SF225)* – Display studying the efficiency of various lighting (incandescent, fluorescent, halogen, Light Emitting Diodes, etc.). Exhibit could be a poster display or an actual item.

SF) H870003   **Electrical Display/Item** *(SF226)* – Show an application of one of the concepts learned in the Wired for Power project. Examples include: re-wiring or building a lamp, re-wiring or making a heavy duty extension cord or developing an electrical diagram of a house. Exhibit could be a poster display or an actual item.

SF) H870004   **Poster** *(SF227)* – Poster should exemplify one of the lessons learned in the Wired for Power Project. Posters can be any size up to 28" x 22".

ELECTRONICS – UNIT 4

SF) H870005   **Electrical/Electronic Part Identification** *(SF228)* – Display different parts used for electrical/electronic work. Exhibit should show the part (either picture or actual item) and give a brief description, including symbol of each part and its function. Display should include a minimum of 10 different parts.

SF) H870006   **Electronic Display** (SF229) – Show an application of one of the concepts learned in the Electronics project. Examples include components of an electronic device (refer to p.35 of the Entering Electronic manual)

SF) H870007   **Electronic Project** (SF230) – Exhibit an electronic item designed by the 4-H'er or from a manufactured kit that shows the electronic expertise of the 4-H'er. Examples include: a radio, a computer, or a volt meter.

SF) H870008   **Poster** *(SF231)* – Poster should exemplify one of the lessons learned in the Entering Electronics Project. Poster can be any size up to 28" x 22".

SET – ROBOTICS

This category involves the many different aspects of Robotics. Participants will learn more about how robots are designed and developed as well as mechanical and electronic elements of robots. Involvements in SET Robotics gives participants a first-hand experience in modern technology.

Youth enrolled in Virtual Robotics, Junk Drawer Robotics (Levels 1, 2, or 3), or Robotics Platforms may exhibit in any class within this division.

RULES:

1. The name and county of each exhibitor should appear separately on the back of each board, poster or article and on the front cover of the notebooks so the owner of the exhibit may be identified if the entry tag is separated from the exhibit.

2. Reports should be written using the scientific method whenever possible (Background, the Question or hypothesis, what you plan to do and what you did, Method used and observations, Results: what you learned. All reports should be computer generated and enclosed in a clear plastic cover. The reports should be attached securely to the display.

3. Posters can be any size up to 28" by 22" when ready for display. Example: tri fold poster boards are not 28" by 22" when fully open for display.

4. Creating a video of your robot in action would be helpful for the judges but is not mandatory. Present as a CD Rom with your robot entry. Videos should be uploaded to a video streaming application and exhibitors should provide a hard copy QR code for viewing.

SF) H861001   **Robotics Poster** *(SF236)* – Create a poster (28: X 22") communicating a robotics theme such as "Robot or Not", Pseudocode". "Real World Robots". "Careers in Robots", "Autonomous Robotics", "Precision Agriculture" or a robotic topic of interest to the 4-H'er.

SF) H861002   **Robotics Notebook** *(SF237)* – Explore a robotics topic in-depth and present your findings in a notebook. Documentation should include any designs, research, notes, pseudocode, data tables, or other evidence of the 4-H'ers

learning experience. The notebook should contain at least three pages. Topics could include a programming challenge, a programming skill, calibration, sensor exploration, or any of the topics suggested in Class 1.

SF) H861003 **Robotics Video** *(SF238)* – This class should be displayed in a notebook. The notebook should include a video clip on a CD/DVD that demonstrates the robot performing the programmed function. Include your pseudocode and screenshots of the actual code with a written description of the icon/command functions. All videos for state fair should be e-mailed to Amy Timmerman   atimmerman2@unl.edu before Aug. 15. Files must be saved in a PC compatible format with county name and last name of participant before emailing.

SF) H861004 **Robotics/Careers Interview** *(SF239)* – Interview someone who is working in the field of robotics and research the career in robotics. Interviews can either be written or in a multimedia format (CD/DVD). Written interviews should be in a notebook. Written reports should be 3 to 5 pages, double spaced, 12 point font, and 1" margins. Multimedia reports should be between 3 to 5 minutes in length.

SF) H861005 **Robotics Sensor Notebook** *(SF241)* – Write pseudo code which includes at least one sensor activity. Include the code written and explain the code function.

SF) H861007 **Kit Labeled Robot** (cannot be programmed) **and Notebook** *(SF243)* – This class is intended for explorations of robotic components such as arms or vehicles OR educational kits marketed as robots that do not have the ability to be programmed to "sense, plan and act." The exhibit should include a notebook with the robot the youth has constructed. Included in the notebook should be 1) a description of what the robot does, 2) pictures of programs the robot can perform, 3) why they chose to build this particular form, and 4) how they problem solved any issues they might have had during building and programming. A picture story of assembly is recommended. If robot is more than 15" inches wide and 20" inches tall they may not be displayed in locked cases.

SF) H861008 **3D Printed Robotics Parts** *(SF244)* **–** This class is intended for youth to create parts through 3D printing, that help create their robot or aid the robot in completing a coded function. Project should include notebook describing the process used to create the project, describe the success of your designed piece (did it work), intended use of the product and the modifications made to the item.

Robotics Showcase

SF) H861003 **Robotics Video** *(SF238)* – This class should be displayed in a notebook. The notebook should include a video clip on a CD/DVD that demonstrates the robot performing the programmed function. Include your pseudocode and screenshots of the actual code with a written description of the icon/command functions. All videos for state fair should be e-mailed to Amy Timmerman   atimmerman2@unl.edu before Aug. 15. Files must be saved in a PC compatible format with county name and last name of participant before emailing.

Team Entries: Contact the Extension office for more information.

C) H861901 **County Only Display** – Any other item completed as part of this project

SET – GEOSPATIAL

SET Geospatial is a diverse category that includes a variety of exhibits 4-H'ers can get involved in. Through participation in this category 4-H'ers will gain more knowledge about Nebraska's rich history and diverse geography. Take close note of the rules to ensure your exhibit qualifies.

1. The name and county of each exhibitor should appear separately on the back of each board, poster or article and on the front cover of the notebooks so the owner of the exhibit may be identified if the entry tag is separated from the exhibit.

2. Reports should be written using the scientific method whenever possible (Background, the Question or hypothesis, what you plan to do and what you did, Method used and observations, Results: what you learned. All reports should be computer generated and enclosed in a clear plastic cover. The reports should be attached securely to the display.

3. Refer to the general rules for the policy regarding firearms, items with a blade, and related items.

4. Please refer to the general rules for the policy regarding use of copywritten images.

SF) H880001 **Poster** *(SF299)* Create a poster (not to exceed 14" X 22") communicating a GPS theme such as How GPS or GIS works, Careers that use GPS or GIS, How to use GPS, What is GIS, GPS or GIS in Agriculture, Precision Agriculture, or a geospatial topic of interest.

SF) H880002 **4-H Favorite Places or Historical Site Poster** *(SF299)* – The 4-H exhibitor identifies a favorite place or historical site (including grave sites) in Nebraska. Exhibit should include latitude and longitude, digital picture, and local area map. Poster size should not exceed 14" X 22".

SF) H880003 **GPS Notebook** *(SF300)* Keep a log of at least 5 places visited using a GPS enabled device. At least one site should be from a community other than where you live. For each site, record the latitude, longitude and elevation. Also include a description of the site, a paragraph explaining what was interesting about the site or finding it. Photos of each site and/or cache are optional but encouraged.

SF) H880004 **Geocache** *(SF301)* Assemble a themed geocache. Each geocache should be a water-tight container. It should include a logbook and pencil for finders to log their visits and may include small trinket, geocoins, etc. for the finders to trade. Documentation should include a title, teaser description and the geographic coordinates of intended placement. Register the site at geocaching.com; include a print-out of its registry. The entry may include a photograph of the cache in its intended hiding place.

SF) H880005 **Agriculture Precision Mapping** *(SF302)* 4-Hers will assemble a notebook that will include a minimum of 2 digital copies of various data layers that can be used in precision agriculture to identify spatial patterns and/or correlations

(printed copies of websites were applications can be purchased is acceptable) A report of how the analysis of the various data will be used to make a management decision.

SF) H880006   **4-H History Map/Preserve 4-H History** *(SF300)* Nominate a Point of Interest for the 4-H History Map Project. Include copy of submitted form in folder or notebook. To nominate a site for the 4-H history map please go to http://arcg.is/1bvGogV   For more information about 4-H history go to http://arcg.is/1bvGogV   For more information about 4-H history go to http://4-hhistorypreservation.com/History_Map. For a step by step video on nominating a point, please go to this link: http://tinyurl.com/nominate4h Write a brief description of historical significance of 4-H place or person. (a minimum of one paragraph)

SF) H880007   **GIS Thematic Map** *(SF302)* Using any GIS software, create a thematic map. Thematic maps can utilize any subject of interest to the 4-H'er. Example map would be Amelia Earhart's or Sir Francis Drake's voyage population density maps, water usage "x11" maps or 4-H project in Nebraska. Create GIS Map using data from books, and/or internet. Use reliable data, (U.S. Center or U, S. Census Bureau etc.) Map any size from 8.5" x 11" up to 36" x 24", which should include Title, Base Map, Neat Line, North Arrow, and Legend. Identify the source of your information on the back of map.

C) H880901   **Other exhibit** in GPS, GIS, or mapping.

SET – ENERGY

This category provides 4-H'ers a way to present their ideas about renewable energy resources. Through participation in this category 4-H'ers will learn more about physics, friction, energy, and elasticity. In addition, participants will make a display to go along with their findings.
1. The name and county of each exhibitor should appear separately on the back of each board, poster or article and on the front cover of the notebooks so the owner of the exhibit may be identified if the entry tag is separated.
2. Reports should be written using the scientific method whenever possible (Background, the Question or hypothesis, what you plan to do and what you did, Method used and observations, Results: what you learned. All reports should be computer generated and enclosed in a clear plastic cover. The reports should be attached securely to the display.

SF) H900001   **Create and Compare Energy Resources Poster** *(SF307)* – Poster should explore 2 alternative/renewable energy sources. Compare and contrast the 2 resources including two of the following information: amount of energy created, costs of production, usability of the energy, pros/cons of environmental impacts, etc. Posters can be any size up to 28" by 22".

SF) H900002   **Experiment Notebook** *(SF305)* – Notebook will explore the scientific method involving alternative/renewable energy sources. Information required. 1.) Hypothesis 2.) Research 3.) Experiment 4.) Measure 5.) Report or Redefine Hypothesis.

SF) H900003   **Solar as Energy Display** *(SF305)* – Item should be the original design of the 4-Her. Include the item, or a picture if item is in excess of 6' tall or 2' x2'. Include a notebook of why the item was designed and how it harnesses the power of the sun. Examples include solar ovens, solar panels. etc.

SF) H900004   **Water as Energy Display** *(SF308)* – Item should be the original design of the 4-Her. Include the item, or a picture if item is in excess of 6' tall or 2' x2'. Include a notebook of why the item was designed and how it harnesses the power of water.

SF) H900005   **Wind as Energy Display** *(SF308)* – Item should be the original design of the 4-H'er. Include the item, or a picture if item is in excess of 6' tall or 2' X 2'. Include a notebook of why the item was designed and how it harnesses the power of wind.

SF) H900006   **Other Nebraska Alternative Energy** *(SF306)* – Notebook should explore Nebraska an alternative energy source besides wind, water, and solar power. Include information on type of power chosen, infrastructure for distribution, what resources are needed to create this alternative resource, cost of production, and potential uses of bio-products.

C) H900901   **County Only Display** – Any other item completed as part of this project.

SET – WOODWORKING

In this category 4-H'ers have the opportunity to create exhibits about varying levels of woodworking. In addition, participants can also create informational exhibits about their woodworking projects. Through involvement in this category 4-H'ers will be better educated about the topic and better their woodworking skills.
Rules: The name and county of each exhibitor should appear separately on the back of each board, poster or article and on the front cover of the notebooks so owner of the exhibit may be identified if the entry tag is separated from the exhibit.
Requirements: All articles exhibited must include a plan (with drawings or sketch or blueprint) stating dimensions and other critical instructions a builder would need to know to build the project. Plans may include narrative instructions in addition to the dimension drawings and include any alterations to the original plan. Part of the score depends on how well the project matches the plans. If the plans are modified the changes from the original need to be noted on the plans. All plans (copied or your own drawing) used for making the article must be securely attached and protected by a clear plastic cover.
1. 4-H'ers must be in Unit 3 or Unit 4 for the exhibit to be considered for State Fair. All projects must have appropriate finish.
2. If the project (i.e. picnic tables, wishing wells, swings, chairs, bridges, doghouses. etc.) is designed to be outside, it may be displayed outdoors. All outside projects MUST have entry tag and supporting information placed in a protective bag to prevent damage from weather events such as rain and be ATTACHED to projects with string, zip ties, etc.

DIVISION 911 – Woodworking Wonders 1/ MEASURING UP Develop skills such as measuring, squaring and cutting a board, driving nails, and using clamps and screws; Examples-Build a picture frame, a letter holder, a box, or an airplane.

C) H911901   **Woodworking Article** – Item made using skills learned in the Measuring Up manual. Items must be entered with construction plans.

C) H911903   **Other Items** – Unit I – Other article as shown in Woodworking Unit I manual or comparable.

DVISION 911 – Woodworking Wonders 2/MAKING THE CUT Measure, cut, sand, drill, and use advanced hand and power tools: Apply paint and use bolts and staples: Examples - Build a sawhorse, birdhouse, tool box or a stool.

C) H911904   **Woodworking Article** – Item made using skills learned in the Making the Cut Manual. Items must be entered with construction plans.

C) H911906   **Other Items –** Unit II – Other article as shown in Woodworking Unit II manual or comparable.

DIVISION 911 – Woodworking Wonders 3/ NAILING IT TOGETHER Practice measuring angles, cutting dado and rabbet joints; Use a circular saw, a table saw, and a radial arm saw,; sand and stain **wood.** Skills learned include either joints, hinges, dowels, or a dado joining. Examples include: bookcase, coffee table or end table.

SF) H911001   **Woodworking Article** *(SF91)* – Item should be made using skills learned in the Nailing it Together manual.

SF) H911003   **Recycled Woodworking Display** *(SF95)* – Article made from recycled, reclaimed or composite wood. Article must be appropriately finished and/or sealed and utilize one or more woodworking techniques from page 2 of the Unit 3 manual. Exhibit must include the woodworking plan and a minimum one page report of how the engineering design process was used to develop the woodworking plan.   Engineering Design Process 1) State the problem (Why did you need this item?) 2) Generate possible solutions (How have others solved the problem? What other alternatives or designs were considered?) 3) Select a solution (How does your solution compare on the basis of cost, availability, and functionality?) 4) Build the item (What was your woodworking plan, and what processes did you use to build your item?) 5) Reason for article finish (What type of finish, how did you finish or why you choose this finish?) 6) Evaluate (How does your item solve the original need?) 7) Present results (How would you do this better next time?)

SF) H911004   **Composite Wood Project** *(SF96)* 60% of the project must be wood and 40% made from other materials such as metal, rubber, resin, etc. All plans and plan alternations must be attached to the article. Protect plans with a cover. If project is designed to be outside it is required to have appropriate outdoor finish because project may be displayed outside.

SF) H911005   **Outdoor Wood Project made with Treated Wood.** *(SF97)* Treated wood projects DO NOT have to have a finished coating. All plans and plan alternations must be attached to the article. Protect plans with a cover. If project is designed to be outside. Examples include: picnic tables, planters, outdoor furniture, etc.

C) H911907   **Other Items** – Unit III – Other article as shown in Woodworking Unit III manual or comparable.

DIVISION 911 –Woodworking Wonders 4/ FINISHING UP Skills learned at this level include dovetailing, using a lathe, overlays, using a router, etc.

SF) H911006   **Woodworking Article** *(SF91)* – Item made using skills learned in the Finishing It Up Project. Item is required to be appropriately finished.

SF) H911008   **Recycled Woodworking Display** *(SF91)* – Article made from recycled, reclaimed or composite wood. Article must be appropriately finished and/or sealed and utilize one or more woodworking techniques from page 2 of the Unit 4 manual. Exhibit must include the woodworking plan and a minimum one page report of how the design and engineering process was used to develop the woodworking plan. 1) State the problem (Why did you need this item?) 2) Generate possible solutions (How have others solved the problem? What other alternatives or designs were considered?) 3) Select a solution (How does your solution compare on the basis of cost, availability, and functionality?) 4) Reason for article finish (What type of finish, how did you finish or why you choose this finish?) 5) Build the item (What was your woodworking plan, and what processes did you use to build your item?) 6) Evaluate (How does your item solve the original need?) 7) Present results (How would you do this better next time?)

C) H911908   **Other Items** – Unit IV – Other article as shown in Woodworking Unit IV manual or comparable.

SET – WELDING

 This category helps 4-H'ers learn the basics of welding. In addition, 4-H'ers get the opportunity to present their knowledge on the topic and display what they have made. Involvement in SET welding gives participants a first-hand experience in a skill that can be used for a lifetime.

RULES

1. The name and county of each exhibitor should appear separately on the back of each board, poster or article and on the front cover of the notebooks so owner of the exhibit may be identified if the entry tag is separated from the exhibit.

2. All welds exhibited in class 1 or 2 must be mounted on a 12" high x 15" long display board of thickness not to exceed 3/8". Attach each weld on a wire loop hinge or equivalent, so the judge can look at the bottom side of the weld when necessary .Each weld should be labeled with information stated 1)type of welding process (stick, MIG, TIG, Oxy-Acetylene, etc.) 2) kind of weld, 3) welder setting, 4) electrode/wire/rod size, 5) electrode/wire/rod ID numbers. **Attach a wire to display board so it can be hung like a picture frame.** No picture frame hangers accepted. If no plans are included with welding article or welding furniture, item will be disqualified.

3. Fabricated board such as plywood, composition board, or particle-type lumber may be used for demonstration displays.

4. Demonstration boards should be sanded and finished to improve appearance. The finish on a demonstration board will be judged as a woodworking exhibit.
5. Reports should be written using the scientific method whenever possible (Background, the Question or hypothesis, what you plan to do and what you did, Method used and observations, Results: what you learned. All reports should be computer generated and enclosed in a clear plastic cover. The report should be attached securely to the display.
6. If no plans are included with the welding art, welding furniture or composite weld project item will be disqualified.
7. All outside projects MUST have entry tag and supporting information placed in a protective bag to prevent damage from weather such as rain and be ATTACHED to projects with string, zip ties, etc.

4-H Welding Project Tips and Suggestions: Class 1
1. All welds should be made with the same electrode/wire/rod size and number.
2. Welds should be made only on one side of metal so penetration can be judged.
3. Welds should be cleaned with chipping hammer and wire brush. Apply a coat of light oil (penetrating oil) to the metal to prevent rusting. Wipe off excess oil.
4. It is suggested that all welds be on the same size and thickness of metal. These pieces, referred to as coupons, should be 1.5" to 2" wide and 3.5" to 4" long. A good way to get this size is to buy new cold rolled strap iron and cut to length. The extra width is needed to provide enough metal to absorb the heat from the welding process and prevent the coupons from becoming too hot before the bead is completed. Narrower coupons will become very hot, making an average welder setting too cold at the bead start, just about right in the middle and too hot at the end. The correct way to weld narrow strips is to make short beads and allow time to cool, however this project requires a full length bead.
5. Stick welding: Suggested coupon thickness – ¼" if using 1/8" rod. Suggested rod AC and DC straight or reverse polarity-first E-7014, second E-6013
6. MIG Welding: Suggested coupon thickness – ¼" if using .035 wire and 1/8" if using .023 wire
7. Oxy-Acetylene: Suggested coupon thickness – 1/8" Suggested rod – 1/8" mild steel rod

CLASS 2 Position Welds
1. It is suggested that all welds be on the same size and thickness of metal. These pieces are referred to as coupons. The welds can be on one coupon that is about 4" x 4" or on individual coupons that are about 2" x 4" inch and ¼" thick. Suggested rods for this class of position welds for AC and DC straight or reverse polarity is, first E-6013, second E-7014 and E-6010 for DC reverse polarity only.
2. Welds should be cleaned with a chipping hammer and wire brush. Apply a coat of light oil (penetrating oil) to the metal to prevent rusting. Wipe off excess oil.
3. **4-H Welding Project Tips and Suggestions: Class 3 & 4.** All welds should be cleaned and protected from rust with paint or light oil. Plans are to be complete enough that if they were given to a welding shop, the item could be made without further instructions. Bill of materials should include a cost for all items used including steel, electrodes, paint, wheels, etc.

SF) H920001   **Welding Joints** *(SF281)* – A display of one butt, one lap and one fillet weld.
SF) H920002   **Position Welds** *(SF281)* – A display showing three beads welded in the vertical down, horizontal and overhead positions.
SF) H920003   **Welding Art** *(SF283)* **–** Any art created using tack welds to hold the metal pieces together (examples include horseshoe projects). Type of welder, welder settings, all plans, plan alternations, and a bill for material must be attached to the article. Protect plans with a cover. If project is designed to be outside, it is required to have appropriate outdoor finish.
SF) H920004   **Welding Article** *(SF281)* – Any shop article or piece of furniture where welding is used in the construction. 60% of item must be completed by 4-H er and notes regarding laser welding or machine welding must be included. Type of welder, welder settings, all plans, plan alternations, and a bill for materials must be attached to the article. Protect plans with a cover. If project is designed to be outside it is required to have appropriate outdoor finish because project may be displayed outside.
SF) H920005   **Welding Furniture** *(SF282)* – any furniture with 75% welding is used in construction. 60% of item must be completed by 4-Her and notes regarding laser welding or machine welding must be included. Type of welder, welder settings, all plans, plan alternations, and a bill for welding must be attached to the article. Protect plans with a cover. If project is designed to be outside it is required to have appropriate outdoor finish because project may be displayed outside.
SF) H920006   **Plasma Cutter/Welder Design** *(SF279)* – Plasma cutter/welders allowed for detailed design(s) to butt cut into metal. 4-H members will create a notebook describing the design process to create "artwork" to butt cut into the metal. In the notebook include:
    a) A photo (front and back) of the finished project.
    b) Instructions on how the design was created (include software used) this allows for replication of the project
    c) Lessons learned or improvements to the project.
    d) Steps to finish the project.
SF) H920007   **Composite Weld Project** – *(SF280)* 60% of the project must be welded and 40% made from other materials such as wood, rubber, etc. Type of welder, welder settings, all plans, plan alternations, and a bill for material must be attached to the article. Protect plans with a cover. If project is designed to be outside it is required to have appropriate outdoor finish because project may be displayed outside.
C) H920900   **County Only Display** – Any other item completed as part of this project.